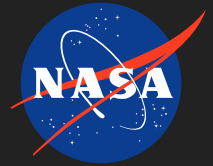


# Risk Engineering, Sciences, Computation, and Informed Decisions, Phase II

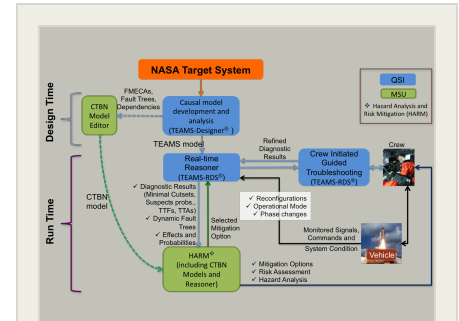
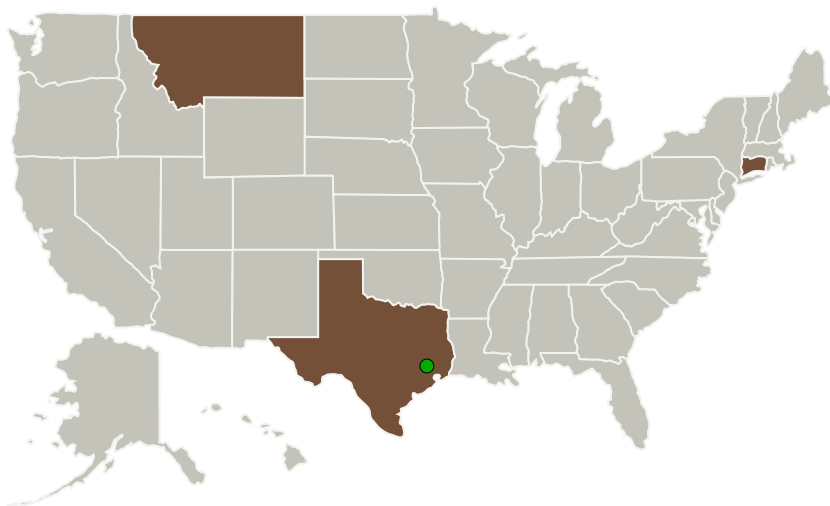
Completed Technology Project (2014 - 2017)



## Project Introduction

Wrong decisions during the missions can lead to an unsafe condition or immediate failure, while correct decisions can help continue the missions even from faulty conditions. In view of the lessons learned from mishaps, i.e., failed space missions, it is imminent that reliability analysis and risk assessment are kept in sync with space system design as it evolves from the concept through preliminary design, detailed design, production, and operations. From the successful proof-of-concept demonstration for the proposal solution in Phase I, Qualtech Systems, Inc. (QSI) in collaboration with Dr. John Sheppard from Montana State University (MSU) proposes to architect the solution for continuous real-time health monitoring and diagnosis, automatically generating current risk assessment for Loss of Mission, Loss of Crew, Loss of Vehicle during vehicle operations while taking into account the current health of the vehicle and operational modes and phases in Phase II. The QSI-MSU team plans to emphasize advancement in the six following areas: (a) enhancement of the existing EPS model/modeling a new target system, (b) dynamic generation of fault-tree by TEAMS-RDS®, (c) expansion of risk modeling and learning, (d) expansion of risk assessment capabilities, (e) Automatic information exchange between TEAMS-RDS® reasoner and CTBN reasoner for both design-time and run-time, and (f) enhancement and incorporation of the risk visualization tool capability into web-based TEAMS-RDS® dashboard. The solution architecture will provide the ability for the crew to assess and select the "right" mitigation option for component failures and subsequently update the health diagnosis and risk assessment given the executed mitigation plan.

## Primary U.S. Work Locations and Key Partners



Risk Engineering, Sciences,  
Computation, and Informed  
Decisions, Phase II

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Risk Engineering, Sciences, Computation, and Informed Decisions,  
Phase II

Completed Technology Project (2014 - 2017)



Organizations Performing Work	Role	Type	Location
Qualtech Systems, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Rocky Hill, Connecticut
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas
Montana State University - Bozeman	Supporting Organization	Academia Alaska Native and Native Hawaiian Serving Institutions (ANNH)	Bozeman, Montana

Primary U.S. Work Locations	
Connecticut	Montana
Texas	

## Project Transitions

▶ **September 2014:** Project Start

✓ **March 2017:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137722>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Qualtech Systems, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Sudipto Ghoshal

**Co-Investigator:**

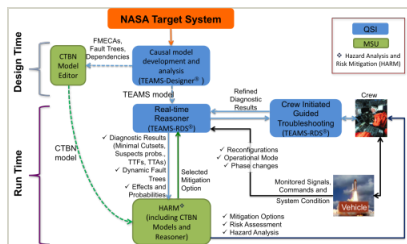
Sudipto Ghoshal

# Risk Engineering, Sciences, Computation, and Informed Decisions, Phase II

Completed Technology Project (2014 - 2017)



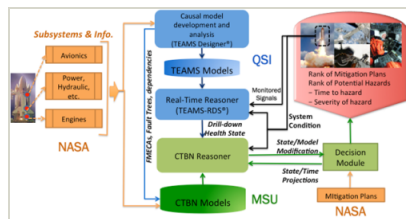
## Images



### Briefing Chart Image

Risk Engineering, Sciences, Computation, and Informed Decisions, Phase II

(<https://techport.nasa.gov/image/128684>)

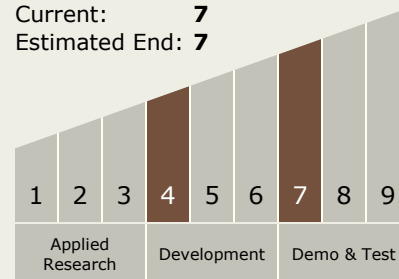


### Final Summary Chart Image

Risk Engineering, Sciences, Computation, and Informed Decisions, Phase II Project Image (<https://techport.nasa.gov/image/134974>)

## Technology Maturity (TRL)

Start: 4  
Current: 7  
Estimated End: 7



## Technology Areas

### Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.1 Infrastructure Optimization
  - TX13.1.6 Test, Operations, and Systems Safety

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System